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09/266,012	03/11/1999	YUKIO YAMAUCHI	0756-1947	5203

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ERIC J ROBINSON
SIXBEY FRIEDMAN LEEDOM & FERGUSON
8180 GREENSBORO DRIVE
SUITE 800
MCLEAN, VA 22102

EXAMINER	
RICHARDS, N DREW	

ART UNIT	PAPER NUMBER
2815	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/266,012	Applicant(s) YAMAUCHI ET AL.
	Examiner N. Drew Richards	Art Unit 2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If the period for reply specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 6-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 6-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. *08/617,121*.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application)

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *19*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Moeller et al. (U.S. Patent No. 4,511,756).

Applicant's admitted prior art teaches on page 1 line 8 through page 2 line 4 an organic electroluminescence display device. The admitted prior art device comprises a thin film transistor formed over a substrate having an active layer of silicon including a source, drain, and channel region. The admitted prior art does not explicitly state that it is formed on a substrate having an insulated surface, however it is well known to one of ordinary skill in the art at the time of the invention to form thin film transistors on insulating substrates. The admitted prior art also teaches an electrode comprising aluminum electrically connected to one of the source and drain regions having a barrier metal interposed between the electrode and the source or drain region to prevent a direct contact therebetween. The admitted prior art also teaches a transparent electrode electrically connected to the thin film transistor and an organic electroluminescence layer adjacent to the transparent electrode. The admitted prior art does not teach forming a barrier metal of titanium.

Moeller et al. teach a method of forming aluminum on silicon. Moeller et al. teach a barrier metal layer between the aluminum and the silicon. Moeller et al. teach on line 4 of the abstract using a barrier metal comprising titanium. With respect to claim 3, Moeller et al. teach that the barrier metal contains nitrogen.

With regard to claim 12, Moeller et al. teach the barrier metal layer comprising titanium nitride where a concentration of nitrogen is 50 atm% or less. This is inherently taught as Moeller et al. form a titanium nitride layer and titanium nitride is one atom titanium to one atom nitride, thus 50 atm% nitride.

Applicant's admitted prior art and Moeller et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to provide a barrier metal of titanium nitride between the silicon source or drain and the aluminum electrode. The motivation for doing so is prevent diffusion of aluminum into the silicon source or drain region. Therefore, it would have been obvious to combine Applicant's admitted prior art with Moeller et al. to obtain the invention of claims 1, 3, and 12.

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art with Moeller et al. (U.S. Patent No. 4,511,756) as applied to claim 1 above, further in view of Tang et al. (U.S. Patent No. 5,550,066).

Applicant's admitted prior art with Moeller et al. teach forming a transparent electrode but do not disclose forming it of indium tin oxide. Tang et al. teach an organic EL display device which has an indium tin oxide transparent electrode. Tang et al. and

Applicant's admitted prior art are from the same field of endeavor. It would have been obvious to one of ordinary skill in the art at the time of the invention to use an indium tin oxide electrode as indium tin oxide (commonly referred to as ITO) is a well known and long established transparent conductor. Therefore, it would have been obvious to combine Applicant's admitted prior art and Moeller et al. with Tang et al. to obtain the invention of claim 2.

4. Claims 6-9, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al. with Applicant's admitted prior art, and further in view of Moeller et al. (U.S. Patent No. 4,511,756).

With regards to claim 6, Tang et al. teach a device having a substrate with an insulating surface, a first thin film transistor having an active layer including source, drain and channel and a gate electrode adjacent to the channel, a second thin film transistor having an active layer including source, drain, and channel and a gate electrode adjacent to the channel, wherein the gate electrode of the second thin film transistor is electrically connected to the drain region of the first thin film transistor as seen in figures 1 and 8. Tang et al. also teaches a transparent electrode connected to the drain of the second thin film transistor and an organic electroluminescence layer disposed adjacent to the transparent electrode. Tang et al. does not teach a conductive layer disposed between the transparent electrode and the drain region of the second thin film transistor. Applicant's admitted prior art teaches a conductive metal (barrier layer) between the drain region and the transparent electrode. The motivation for

combining Tang with Applicant's admitted prior art is to prevent diffusion of silicon into the electrode. Neither Tang et al. nor Applicant's admitted prior art teach that the conductive layer comprises titanium. Moeller et al. teach using a titanium barrier as discussed above with regards to claims 1 and 3.

With regard to claim 7, the titanium barrier of Moeller et al. is disclosed as titanium nitride.

With regard to claim 8, Tang et al. teach a counter electrode opposed to the transparent electrode with the organic electroluminescence layer interposed therebetween, wherein the counter electrode comprises magnesium and silver.

With regard to claim 9, Tang et al. teach a thin film transistor formed over a substrate having an active silicon layer with source, drain and channel regions, a transparent electrode electrically connected to the thin film transistor, an organic electroluminescence layer adjacent to the transparent electrode, and a peripheral driving circuit comprising another thin film transistor formed over the substrate. Tang et al. do not teach an electrode comprising aluminum electrically connected to one of the source and drain regions and a barrier metal layer interposed between the electrode and the one of the source and drain regions to prevent a direct contact therebetween. This is taught by Applicant's admitted prior art to allow low resistance electrical communication with a diffusion barrier to prevent silicon diffusing from the active layer to the electrode. Applicant's admitted prior art does not teach the barrier metal comprising titanium. This is taught by Moeller et al. as discussed previously.

With regards to claims 13 and 14, Moeller et al. teach the barrier metal layer comprising titanium nitride where a concentration of nitrogen is 50 atm% or less. This is inherently taught as Moeller et al. form a titanium nitride layer and titanium nitride is one atom titanium to one atom nitride, thus 50 atm% nitride.

5. Claims 10, 11 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al. (U.S. Patent No. 5,550,066) in view of Takemura (U.S. Patent No. 5,828,429).

Tang et al. disclose an organic electroluminescence display device on columns 1-14 and in figures 1-9. More specifically, Tang et al. disclose a substrate 41 having an insulating surface, at least one X-direction signal line over the substrate and at least one Y-direction signal line crossing the X-direction signal line as seen in figure 1, a thin film transistor formed over the substrate at an intersection of the X-direction and Y-direction signal lines having an active layer comprising silicon including source, drain, and channel regions, a transparent electrode (anode electrode), and an organic electroluminescence layer 82 adjacent to the transparent electrode. The structure of the organic electroluminescence display device can be seen in figure 8. Tang et al. do not explicitly disclose a peripheral driving circuit comprising another thin film transistor formed over the substrate for supplying a signal to one of the X-direction or Y-direction signal lines. Takemura teach an electroluminescent display device having a peripheral driving circuit comprising a thin film transistor formed over the substrate for supplying a signal to one of the X-direction and Y-direction signal lines in column 16 lines 48-52.

With regard to claim 11, the thin film transistor and another thin film transistor being manufactured through the same process is a product-by-process limitation that does not structurally distinguish over the prior art.

Tang et al. and Takemura are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to provide a second thin film transistor in a peripheral driving circuit for supplying a signal to the X-direction or Y-direction signal lines. The motivation for doing so is to allow controllable selection and switching on and off of the electroluminescent devices. Therefore, it would have been obvious to combine Tang et al. with Takemura to obtain the invention of claims 10 and 11.

With regard to claim 15, Tang et al. disclose an organic electroluminescence display device including a substrate 41 having an insulating surface, at least one X-direction signal line over the substrate and at least one Y-direction signal line crossing the X-direction signal line as seen in figure 1, at least one pixel defined at an intersection between the X-direction and Y-direction signal lines, at least one switching thin film transistor and one current control thin film transistor formed over the substrate in the pixel, and organic electroluminescence layer 82 over the substrate. Tang et al. do not explicitly disclose a peripheral driving circuit comprising at least a third thin film transistor formed over the substrate for supplying a signal to one of the X-direction or Y-direction signal lines. Takemura teach an electroluminescent display device having a peripheral driving circuit comprising a third thin film transistor formed over the substrate for supplying a signal to one of the X-direction and Y-direction signal lines in column 16

lines 48-52. Tang et al. further teach the transistors comprising a semiconductor layer comprising crystalline silicon and including source, drain and channel regions, a gate insulating film adjacent to the semiconductor layer and a gate electrode adjacent the gate insulating film. One of ordinary skill in the art would recognize that the in the combination the third transistor would be formed with a similar structure as the switching and current control transistors. With regard to claim 16, the gate electrode can be seen over the channel region with the gate insulating film interposed therebetween.

Tang et al. and Takemura are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to provide a third thin film transistor in a peripheral driving circuit for supplying a signal to the X-direction or Y-direction signal lines. The motivation for doing so is to allow controllable selection and switching on and off of the electroluminescent devices. Therefore, it would have been obvious to combine Tang et al. with Takemura to obtain the invention of claims 15 and 16.

With regard to claim 17, Tang et al. disclose an organic electroluminescence display device including a substrate 41 having an insulating surface, at least one X-direction signal line over the substrate and at least one Y-direction signal line crossing the X-direction signal line as seen in figure 1, at least one pixel defined at an intersection between the X-direction and Y-direction signal lines, at least one switching thin film transistor and one current control thin film transistor formed over the substrate in the pixel, and organic electroluminescence layer 82 over the substrate. Tang et al. do not explicitly disclose a peripheral driving circuit comprising at least a third thin film

transistor formed over the substrate for supplying a signal to one of the X-direction or Y-direction signal lines. Takemura teach an electroluminescent display device having a peripheral driving circuit comprising a third thin film transistor formed over the substrate for supplying a signal to one of the X-direction and Y-direction signal lines in column 16 lines 48-52. Tang et al. further teach the transistors comprising a semiconductor layer comprising crystalline silicon and including source, drain and channel regions, a gate insulating film adjacent to the semiconductor layer and a gate electrode adjacent the gate insulating film. One of ordinary skill in the art would recognize that the in the combination the third transistor would be formed with a similar structure as the switching and current control transistors. The limitation of the transistors being manufactured through the same process is a product-by-process limitation that does not structurally distinguish over the prior art. With regard to claim 18, the gate electrode can be seen over the channel region with the gate insulating film interposed therebetween.

Tang et al. and Takemura are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to provide a third thin film transistor in a peripheral driving circuit for supplying a signal to the X-direction or Y-direction signal lines. The motivation for doing so is to allow controllable selection and switching on and off of the electroluminescent devices. Therefore, it would have been obvious to combine Tang et al. with Takemura to obtain the invention of claims 17 and 18.

Response to Arguments

6. Applicant's arguments with respect to claims 10 and 11 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Drew Richards whose telephone number is (703) 306-5946. The examiner can normally be reached on M-F 8:00-5:30; Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

NDR
March 11, 2002

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800